SURVEY ORGANIZATION MANUAL FOR DEMOGRAPHIC AND HEALTH SURVEYS

ICF International
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MEASURE DHS assists countries worldwide in the collection and use of data to monitor and evaluate population, health and nutrition programs. Funded by the United States Agency for International Development (USAID). MEASURE DHS is implemented by ICF International from its office in Calverton Maryland, in collaboration with its partner organizations: the Johns Hopkins University Bloomberg School of Public Health's Center for Communication Programs, the Program for Appropriate Technology in Health (PATH), the Futures Institute, CAMRIS International, and Blue Raster.

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I. INTRODUCTION

This manual is intended as an aid to host country survey staff, donors, and others. It explains the standard approach to implementing Demographic and Health Surveys (DHS). These household-based surveys are designed to collect data on fertility, family planning, mortality, reproductive health, child health, nutrition, HIV/AIDS, and a number of other topics. This document provides general guidelines for organizing and implementing a DHS survey. It is part of a set of manuals and guidelines designed to provide step-by-step guidance in designing and implementing DHS surveys. For more information, see the DHS Toolkit at www.measuredhs.com.

What is a DHS?

- DHS stands for Demographic and Health Survey
- It is a standardized, household-based survey that collects a wide range of data on population, health and nutrition
- DHS also refers to the international program that assists countries to implement such surveys (as part of MEASURE DHS)
- Key indicators measured in a DHS include fertility rates, under-five mortality rates, contraceptive use, skilled assistance with births, childhood immunization coverage, nutritional status of children, women, and men, and knowledge and behavior regarding HIV/AIDS
- Most DHS surveys also include "biomarker" tests, such as anemia and HIV testing
- The DHS program is implemented by ICF International and a number of partner organizations through a contract with the U.S. Agency for International Development (USAID)
- DHS staff provide technical assistance through short-term visits to participating countries

The MEASURE DHS program was established by the United States Agency for International Development (USAID) in 1984. The project has been implemented in 5-year phases, the current phase (2008-2013) being the sixth. The DHS program is implemented by ICF International, a private consulting firm in Calverton, Maryland, USA (formerly called Macro International Inc.). Several other organizations are partnering with ICF on the DHS project: Johns Hopkins University; PATH; Futures Institute; CAMRIS; and Blue Raster.

The objectives of the MEASURE DHS program are to:

- provide decision-makers in participating countries with reliable information and analyses useful for informed policy choices;
- improve coordination and partnerships in data collection at the international and country levels;

- develop in participating countries the skills and resources necessary to conduct high-quality demographic and health surveys;
- improve data collection and analysis tools and methodology; and
- improve the dissemination and utilization of data.

Between 1984 and 2011, over 250 nationally representative household-based surveys have been completed under the DHS program in 90 countries. Many countries have conducted multiple surveys with DHS program assistance to establish trend data that enable them to gauge progress in their programs. Participating countries consist primarily of those that receive USAID assistance; however, DHS staff also provide assistance to non-USAID-supported countries with funding from other sources. Even in USAID-supported countries, the majority of DHS surveys also receive funding from non-USAID donors (e.g., UNICEF, UNFPA, The World Bank, the Global Fund, and bilateral donors from the United Kingdom, Ireland, Japan, etc.).

The MEASURE DHS program is executed by a staff of approximately 70 people, consisting of demographers, data processing specialists, physicians, public health professionals, geographers, biomarker specialists, data analysts, laboratory technicians, qualitative research experts, data dissemination specialists, editors, and report production staff. Because of the international nature of the work, DHS staff are drawn from many countries and speak more than 20 languages.

MEASURE DHS staff provide technical assistance at critical stages of survey implementation in order to ensure that survey procedures are consistent with the technical standards set by DHS and that survey activities progress on schedule. Assistance is provided mainly during visits to the country, though staff also spend time at ICF preparing for visits and back-stopping the survey.

Three general principles guide MEASURE DHS technical assistance. First, to efficiently utilize project staff, technical support is usually provided through short-term visits of 1-4 weeks' duration, rather than through long-term resident advisors, although the latter have also been used in special situations. Second, in keeping with the DHS objective of strengthening in-country survey capability, MEASURE DHS visits provide technical support for the local staff, with the in-country organization being responsible for arranging survey activities. Third, to maintain continuity and minimize miscommunication, technical assistance is provided by the same people through the life of the survey, to the extent possible.

Capacity building is an important objective of the MEASURE DHS program. DHS firmly believes that the best way to build expertise is through participation in implementing the survey ("on-the-job training"). The work plan may also specify formal training activities, such as sponsoring staff to attend short-term workshops and courses or arranging for DHS staff to make more formal presentations or workshops while in-country.

The number of MEASURE DHS technical assistance visits needed for

a particular survey varies, depending on the availability, skill, and experience of the local staff, as well as on the complexity of the survey. For most surveys, between 8 and 14 visits are sufficient (see Box 1).[1] Trips are usually related to the accomplishment of major survey tasks: survey design, questionnaire design, pretest, sample design, field staff training, fieldwork monitoring, data processing, data analysis, report writing, further analysis studies, and dissemination activities (particularly the national seminar). The first one or two visits to a country by MEASURE DHS staff are usually for the purpose of assessing the feasibility of conducting a DHS survey and for fundraising if required. During these visits the national implementing agency is identified, the survey objectives, scope of work, timetable, and budget are developed and a project agreement is developed. To accomplish these tasks, experienced senior DHS staff make these initial visits. Subsequent visits are made by the DHS staff person who will have the primary responsibility for the survey (the country manager) and who also arranges for visits by staff with specialized skills for assistance with sampling, data processing, data analysis, and data dissemination.

The need for specific technical assistance visits by DHS staff can be anticipated and should be written into the project work plan so as to ensure that appropriate staff are available for technical assistance visits at the time needed. However, it is also recognized that technical assistance needs are not fully predictable. Accordingly, the visits scheduled in the project work plan are viewed as an expected set of visits and countries may request additional visits whenever they are perceived to be needed.

BOX 1. TYPICAL TECHNICAL ASSISTANCE VISITS IN A DHS

No.	Purpose	Type of Staff	Length of Visit
1.	Survey design and planning	Regional coordinator	2 weeks
2.	Sample design	Sampling expert	2 weeks
3.	Questionnaire design	Country manager	2 weeks
4.	Pretest training / fieldwork	Country manager	4 weeks
5.	Main field staff training	Country manager	4 weeks
6.	Main field staff training	Biomarker specialist	2 weeks
7.	Data processing set-up	Data processing specialist	3 weeks
8.	Fieldwork monitoring	Country manager	3 weeks
9.	Dataset finalization / preliminary tabulations	Data processing specialist	3 weeks
10.	Preliminary report	Country manager	2 weeks
11.	Report writing workshop	Country manager	2 weeks

1 Although not well-defined, MEASURE DHS also refers to some surveys as requiring only "limited technical assistance," i.e., fewer visits and less support.

12. National seminar	Country manager	1 week
13. National seminar / data dissemination	Communications specialist	2 weeks
TOTAL		32 weeks

Notes:

Trip 4 assumes 2-3 weeks of pretest training, at least 1 week of data collection and several days to de-brief field staff and make final revisions to the questionnaires and manuals.

Trip 6 is for specialized training on anemia and/or other biomarker tests. In surveys utilizing new biomarkers or in which the sample size is large, a visit of a biomarker specialist at the time of the pretest may be needed. In some countries, if there are a large number of field staff to be trained or a long (4-week) training course, a second person is often sent to relieve the country manager and help get the teams into the field.

If computers or tablets are used instead of paper questionnaires, the data processing specialist usually visits at the time of the pretest and main training.

If biomarkers require laboratory testing (e.g., HIV, malaria blood smears), then an additional visit by a biomarker specialist to work with the laboratory staff may be useful.

In addition to the DHS surveys, the DHS program consists of several other types of surveys, including several population-based surveys and surveys of health facilities (see Box 2). MEASURE DHS also conducts activities related to surveys, such as workshops, analysis, and activities related to expanding data dissemination and use.

BOX 2. OTHER COMPONENTS OF THE MEASURE DHS PROGRAM

- AIDS Indicator Surveys (AIS)—standardized household-based surveys that collect internationally accepted HIV/AIDS indicators, e.g., for the President's Emergency Plan for AIDS Relief (PEPFAR), the UN General Assembly Special Session (UNGASS), and UNAIDS
- Malaria Indicator Surveys (MIS)—standardized, household-based surveys that collect data on internationally accepted malaria indicators (e.g., for Roll Back Malaria and the President's Malaria Initiative) such as ownership and use of insecticide-treated nets and use of malaria medications
- Key Indicator Surveys (KIS)—a set of short household-based survey questionnaires designed for collecting a few basic indicators on a sub-national basis
- Service Provision Assessments (SPA)—surveys of health care facilities and clients to assess the infrastructure, quality, and availability of family planning, maternal and child health, and HIV services in a country; includes the Service Readiness questionnaires
- Qualitative research—focus groups, in-depth interviews, etc., designed to explain quantitative survey findings and explore people's attitudes and motivations related to heath issues
- Biomarkers (anemia, HIV, vitamin A, malaria, blood pressure, syphilis, etc.)

II. Survey Structure

A. The Survey Implementing Organization

As a general rule, the overall responsibility for executing a DHS resides with a single implementing agency. This agency can be a governmental, non-governmental, or private-sector organization such as a National Statistical Office, a family planning organization, the Ministry of Health, a university, a government research group, or a private research firm.

National statistical offices are often the most appropriate organization because they are usually the source of the sampling frame and the organization that has most experience in the execution of national-level surveys. Moreover, they often have a network of offices in the major administrative areas in the country. Family planning organizations and Ministries of Health have the advantage that they usually are the primary users of the information gathered through the survey. Even if the Ministry of Health is not the implementing organization, their involvement in the design and analysis of the survey is crucial since they are one of the main users of the survey results.

The data collected in a DHS survey are used by a diverse set of institutions in the areas of health, fertility, family planning and nutrition. All such groups should be consulted at the outset of a DHS survey and brought into the planning process. It is quite possible that particular institutions, other than the implementing organization, will assume important roles in the survey by having specific responsibilities (e.g., assisting with sampling or questionnaire design, or contributing specific resources such as vehicles, office facilities, or staff with survey experience). This can greatly benefit the quality and the eventual use of the data.

B. Steering Committee

It is recommended that the national implementing organization establish a survey steering committee to provide advice and support for the survey. Generally, the committee would be concerned with the goals and objectives of the survey, policy issues, and technical issues such as questionnaire content. Such a committee can be helpful by providing broad support and ensuring that the survey results are accepted and used by national institutions in the health and family planning fields. The committee should meet several times at the outset of the survey, be briefed on the survey results as soon as possible after the completion of the fieldwork, and play a meaningful role in the national seminar at the end of the survey.

While it is wise to keep the steering committee to a manageable size, its membership should include representatives from a broad spectrum of governmental and non-governmental institutions, including government officials, university scholars and representatives of international organizations and donor institutions. In general, it is appropriate for all organizations with specific survey responsibilities to also be represented on the advisory committee.

If the steering committee consists of high-level officials, it is often useful to organize a technical committee composed of mid-level staff with expertise in the subject matter of the survey to provide input on aspects of survey implementation, such as questionnaire design, sample implementation, recruitment and training of field staff, and fieldwork logistics. The technical committee is generally smaller and meets more frequently than the steering committee.

C. STAFFING

The project director is usually a senior staff member of the implementing agency. The project director may have broad responsibilities within the implementing organization with heavy demands on his or her time so that s/he can head the survey only in a nominal sense. In these cases, the project director is expected to provide policy guidance but the operational control of the survey will be the responsibility of a survey director.

The survey director should ideally have experience with household sample surveys in the areas of population and health and be sensitive to the potential pitfalls of survey research. The role of the survey director extends beyond organizational and decision-making responsibilities and includes "hands-on" participation in all phases of survey implementation (questionnaire design, pretest, training of the field staff, fieldwork, data processing, etc.).

The survey director should be sufficiently free from competing responsibilities to devote full time to the survey, especially during the planning and training stages to ensure full knowledge of the content of the survey and support for the decisions that need to be taken. The success of a survey frequently depends heavily on the capability and availability of this person.

A deputy survey director should be appointed who can, in the absence of the survey director, carry out the survey plan and make decisions on operational issues. This person should be familiar with household surveys

and should be available full time during the survey planning, field staff training and the first weeks of fieldwork. The early days of fieldwork are extremely important for quality assurance purposes; detailed supervision of all aspects related to implementation of the survey is necessary during this time.

In addition, there should be at least two fieldwork coordinators who are in charge of the organization and supervision of the survey fieldwork. They should be full-time during the preparation for fieldwork, field staff training, and the fieldwork itself. Other staff necessary to the successful implementation of a DHS include a sampling expert, a geographic information coordinator, data processing staff, analysts, data communication specialists, accountants, drivers, office support staff, and sometimes lab personnel.

If the survey includes biomarkers, a biomarker specialist should be identified to assist in the training and to monitor data collection periodically throughout the fieldwork, in order to assure that the biomarkers are being collected and processed correctly. The biomarker specialist can also assist in the data analysis and report writing.

A prototype DHS staffing pattern is presented in Appendix A.

D. Work Plan, Timetable, and Budget

Survey design requires the development of several documents. The **work plan or protocol** specifies the responsibilities of all organizations that are involved in the survey (e.g., the implementing organization, the Ministry of Health, the laboratory (if applicable), and MEASURE DHS). It also describes the decisions taken as to the design of the survey, including the sample size and distribution, broad content of the questionnaires, biomarkers, the number and composition of fieldwork teams, data processing, plans for reports and use of the data, and a timetable. Major aspects of the work plan include:

- Number and organization of all senior survey personnel
- Major aspects of questionnaire content, modules, and biomarkers
- Languages to be used for the questionnaires
- Sample size, number of sample points, stratification, and distribution by province, district, etc.
- Number, type and source of vehicles
- Specific plans for pretesting and for recruitment and training of field staff
- Number and composition of fieldwork teams and the responsibilities of each type of team member
- Equipment needed (GPS units, scales, height boards, computers, biomarker supplies)
- Number and types of staff needed for data processing and analysis
- Plans for data dissemination through the national seminar, regional seminars, etc.

Details on these aspects are discussed in later sections in this manual.

Once the work plan or protocol is finalized, DHS procedures call for submitting it for review to an institutional review board or ethics review panel in country to ensure the protection of human subjects. This is particularly important if the survey includes biomarkers. Protocols for all surveys in which the DHS project participates must also be approved by the ICF Institutional Review Board.

The **survey timetable** (see Box 3) acts as a reminder for the survey staff of when the various stages need to be completed and the sequence in which they need to be completed. The first date to fix is often the timing of the data collection (fieldwork), which usually needs to be completed in a particular period due to climatic and other considerations. It is also useful to develop a much more detailed list of activities and timing in order to ensure that no element is missed.

Some activities in the performance schedule can overlap with other

activities. For example, household listing can take place while the survey questionnaire is being developed; the Key Findings report can be prepared while the final report is being reviewed.

It would be unusual if there were no changes to a performance schedule in the course of survey execution. Paramount in any change is to keep the whole operation within the overall time frame and budget.

The recommended **budget** for a DHS survey is subdivided by the major tasks (e.g., pretest, household listing, training of field staff, fieldwork). Each section should contain the line items pertaining to it (e.g., pretest interviewer salaries, pretest interviewer per diems, pretest questionnaire printing). The objective is to provide sufficient detail so that funding for essential survey activities is not overlooked. A prototype survey budget template appears in Appendix B.

BOX 3. ILLUSTRATIVE TIMETABLE OF KEY ACTIVITIES IN A DHS

No.	Activity	Dates
1.	Survey design	Month 1
2.	Sample design	Month 2
3.	Questionnaire design	Month 3
4.	Questionnaire translation / preparation of manuals	Month 4
5.	Pretest	Month 5
6.	Revision of questionnaires and manuals	Month 6
7.	Household listing /collection of GIS coordinates	Months 6-7
8.	Training of field staff	Month 8
9.	Data collection	Months 9-12
10.	Data entry and editing	Months 9-13
11.	Final data checking and cleaning	Month 14
12.	Preparation / review of the preliminary report	Month 15
13.	Production / review of tabulations for final report	Month 16
14.	Report writing workshop	Month 18
15.	Review and revision of the final report	Months 19-20
16.	Preparation of Key Findings report, fact sheets, etc.	Month 21
17.	Printing of final report and other materials	Month 22
18.	National seminar	Month 23
19.	Further analysis and/or other data dissemination activities	Months 24-28

Notes:

Inclusion of biomarkers can delay the timing of the pretest and main survey if there are delays in procuring or clearing of the medical supplies and/or in obtaining approvals from human subject review boards.

Laboratory testing can also have an impact on the timetable. For example, the standard DHS protocol for HIV testing requires that the laboratory testing of the dried blood spots will not begin until the questionnaire file has been completely checked and finalized and any information that could be used to identify an individual has been destroyed. Thus, it usually takes place around Months 16-18. Laboratory testing for other conditions (e.g., malaria, vitamin A) can be scheduled any time after samples reach the lab.

If survey funding is being provided from multiple sources, the budget should identify which budget line items are being covered by each donor. In

such cases, it is often useful to prepare a **Memorandum of Understanding** (MOU), a brief, non-legally binding document that states the responsibilities and contributions (both monetary and in-kind) of the various organizations. The MOU should contain the work plan, timetable, a budget by line item and donor, and space for signatures by all parties.

Once funding is secured, it is important to discuss the mechanisms by which funds will be provided to the implementing organization(s) and any restrictions or time frames for which the funds must be used. Host country contributions may be contained in national budgets or provided in-kind in the form of office space and government personnel time. Donor funds may be provided directly to the implementing organization or through the MEASURE DHS program via subcontracts with the implementing organization.

Tracking survey costs closely is important in order to avoid cost overruns. Where such overruns are unavoidable, early detection is important, because additional funds will need to be committed to complete the work as planned. If no additional funds are available, the scope of work will need to be adjusted to fit activities and outputs within the available budget.

III. Survey Design and Implementation

A. Sample Design and Implementation

DHS surveys are nationally representative and usually involve two stages of sampling. The first stage requires an up-to-date sampling frame, i.e., a list of small administrative units with defined boundaries and known population size, usually census enumeration areas (EAs). For most surveys, 300-500 of these EAs are selected from the sampling frame list with probability proportional to population size. Selection procedures can involve stratification. If the EAs are too large, they can be segmented into smaller units of about 150-200 households during a field enumeration operation. The sample can then be selected from these segments, using procedures similar to those used during first stage sampling.

After the EAs (also sometimes called clusters) are selected, DHS strongly recommends that a household listing operation be implemented. This involves sending a small team (usually 2 people) to each selected EA to locate the boundaries, draw a sketch map, and prepare a list with the name of the head and the address or location of each household. Ideally, the listing team also writes a unique number on the house in chalk or marker and notes the location of the house on the sketch map. Finally, for most surveys, the household listing is the time when geographic coordinates (latitude and longitude) are collected for each EA, using a geographic positioning system (GPS) unit. When the household listing is complete, survey staff in the central office select individual households from the list using computerized spreadsheets. Many survey organizations do not implement a separate household listing prior to the data collection, but instead conduct household listing and selection by the interviewing teams immediately before the data collection starts. Although this design may reduce overall survey costs, DHS discourages combining the listing with the data collection because studies have shown that it tends to introduce biases in the selection process. In order to ensure that the household listing is current and to minimize non-response, DHS recommends that the time period between the household listing and the start of the data collection not exceed six months.

In the selected households, all women of reproductive age (15-49) are eligible for an individual interview, although samples of ever-married women are occasionally implemented in countries where pre-marital childbearing is rare. Sub-samples of men are included in many countries, generally by interviewing all men in every second or third household. If questions on domestic violence are included, they are administered to only

one randomly selected woman per household.[2]

DHS samples are usually not self-weighting, due to the need for data for specific regions or areas of the country that often need to be over-sampled. Consequently, sample weights need to be applied to the survey data when creating tabulations at the national level. All the above issues are described in greater detail in the *Sampling Manual for Use with Demographic and Health Surveys*. The manual also presents the DHS approach to issues such as optimum sampling frames, stratification, sample domains, stages, and sample selection. A chapter on household listing describes how to locate selected sample points, how to draw location and sketch maps, and how to list the households and structures. The collection and use of the geographic coordinates for each cluster is discussed in detail in the DHS manual, *Incorporating Geographic Information into Demographic and Health Surveys: a Field Guide to GPS Data Collection*.

A MEASURE DHS sampling expert usually visits a country to work with local DHS staff to review the sample frame, design the sample, select the clusters, and train the household listing teams. The sampling expert also provides spreadsheets for selecting households from the listing, and after the fieldwork is over, helps compute sample weighting factors and sampling errors for selected variables.

The basic approach of the DHS program is to collect data that are comparable across countries. To achieve this, standard model questionnaires have been developed (see *DHS Model Household Questionnaire*, *DHS Model Woman's Questionnaire*, and *DHS Model Man's Questionnaire*). These model questionnaires—which have been reviewed and revised in each phase of the DHS program—form the basis for the questionnaires which are applied in each country. Adoption of the model questionnaire allows all the major indicators to be produced on a comparable basis across and within countries.

DHS surveys are designed to collect data on fertility, family planning, reproductive health, child health, nutrition, HIV/AIDS, and other topics (see Box 4). Due to the subject matter of the survey, women of reproductive age (15-49) are the focus of the survey. Women eligible for an individual interview are identified through the households selected for inclusion in the sample. Consequently, all DHS surveys utilize a minimum of two questionnaires—a Household Questionnaire and a Woman's Questionnaire.

The *DHS Model Household Questionnaire* is used to list all the usual members and visitors in the selected households. Some basic information is

2 The DHS domestic violence module is usually administered to women respondents only; in case it is administered to men as well, then only one person per household is selected to respond to those questions.

collected on the characteristics of each person listed, including age, sex, education, and relationship to the head of the household. The main purpose of the Household Questionnaire is to identify women (and men, if applicable) eligible for individual interview, and children under age five years who are eligible to be weighed, measured and tested for anemia. In addition, information is collected about the dwelling itself, such as the source of water, type of toilet facilities, materials used to construct the house, ownership of various consumer goods, use of iodized salt, and information about mosquito nets. The Household Questionnaire is also used to measure the extent of orphanhood among children under age 18. If HIV testing is included in the survey, results of the informed consent procedure are recorded on the Household Questionnaire.

Box 4. Key Indicators Collected in a DHS[1]

Fertility and Family Planning

- age-specific, **adolescent**, and total fertility rates
- fertility preferences of women (percentage who want no more children, ideal number of children)
- knowledge of specific contraceptive methods, **contraceptive prevalence rate** by method
- **unmet need for family planning**
- level of unwanted and mistimed births
- median age at first marriage among women

Maternal and Women's Health

- **antenatal care coverage** and timing of care by trimester
- tetanus toxoid coverage among pregnant women
- proportion of births taking place in a health facility
- **proportion of births attended by skilled medical personnel**
- postnatal care coverage for women and children

Child Health

- **under-five mortality rate; infant mortality rate**
- percentage of newborns of low birthweight
- **childhood vaccination coverage rates** by vaccine and dose
- prevalence of diarrhea among children under five and use of oral rehydration therapy
- prevalence and treatment of fever and symptoms of acute respiratory infection among children under five

Nutrition

- exclusive breastfeeding among infants under 6 months
- infant and young child feeding practices for children age 6-23 months, including dietary diversity
- nutritional status (stunting, wasting, **underweight**) among children under age five
- nutritional status (body mass index) of women 15-49
- prevalence of anemia among children 6-59 months and women 15-49
- vitamin A supplementation coverage among postpartum women and children under five
- testing of household salt sample for iodine content

HIV/AIDS

- **awareness of means of HIV prevention among women**
- rejection of misconceptions about HIV transmission and symptoms
- indicators of HIV stigma
- median age at first sex; prevalence of multiple partners; **condom use with non-marital non-cohabiting partners**
- number of sexual partners in the past 12 months (according to marital status) and concurrent partners
- proportion of women who have been tested for HIV and whether received results

Malaria

- **use of insecticide-treated mosquito nets among children under five** and pregnant women
- proportion of women who received intermittent preventive treatment for malaria during recent pregnancy
- **proportion of children under 5 with recent fever treated with appropriate anti-malarials**

General

- **source of household drinking water**; **type of toilet facility**; use of solid fuels
- household socio-economic status (wealth quintiles)
- education level attained by household population; **net enrolment (attendance) ratio**

in primary education; literacy rate of 15-24 year-olds; gender parity index

Note: Millennium Development Goal indicators are shown in bold

Most indicators are produced separately by sex, 5-year age group, urban-rural residence, education, wealth quintile, and by broad geographic administrative areas, depending on sample design.

The *DHS Model Woman's Questionnaire* is used to interview women age 15-49. It covers the following sections:

- Background characteristics (age, education, literacy, religion, etc.)
- Reproductive history
- Knowledge and use of contraceptive methods
- Antenatal care, delivery care and postnatal care
- Breastfeeding and infant feeding practices
- Immunization, child health, and nutrition
- Marriage and recent sexual activity
- Fertility preferences
- Husband's background and respondent's work
- Knowledge about HIV/AIDS and other sexually transmitted diseases
- Other health issues, e.g., recent injections, smoking habits
- A 5-year calendar to record births, pregnancies, and contraceptive use by method

The *DHS Model Man's Questionnaire* is used to interview men age 15-49, though it is often modified to interview men 15-54 or 15-59. It is usually administered to all men living in a sub-sample of households (typically every second or third household). The Man's Questionnaire covers the following sections:

- Background characteristics (age, education, literacy, religion, etc.)
- Reproductive history
- Knowledge of contraceptive methods
- Marriage and recent sexual activity
- Fertility preferences
- Employment and gender roles
- Knowledge about HIV/AIDS and other sexually transmitted diseases
- Other health issues, e.g., recent injections, smoking habits

MEASURE DHS staff work with local counterparts on the adaptation of questionnaires to reflect the needs of the country. The DHS model questionnaires are lengthy, so additions need to be carefully considered in view of the overall length of the instruments. Data quality is likely to suffer if the questionnaires become unwieldy and take too long to administer.

Since many countries need information in addition to what is included in the model questionnaires, DHS has developed several optional modules. Use of these standard modules increases the comparability of data across and within countries, as well as saving time and effort in developing new questions. The optional modules developed by DHS include:

- Maternal mortality
- Domestic violence

- Female genital cutting
- Health expenditures
- Fistula

B. BIOMARKERS

As part of the model questionnaires, DHS surveys include a number of "biomarkers", namely: height and weight (anthropometry) of children, women, and men, anemia testing of children age 6-59 months, and women and men age 15-49, and HIV testing of women and men interviewed in the survey.[3] Details on the standard DHS biomarkers are given in the *DHS Biomarker Field Manual*. As stated previously, when biomarkers are included, it is necessary to have the survey protocol reviewed by a human subjects review board.

Anthropometric measurements

The standard DHS anthropometric measurements consist of taking the height and weight of children under five and women 15-49. In some surveys, measurements are also taken for the subsample of men who are eligible for interview. Height measurements are carried out using a portable measuring board. Children younger than 24 months are measured lying down (recumbent length) on the board, while standing height is measured for older children. Weight measurements are obtained using lightweight, digital scales designed to facilitate weighing of mothers and their children.

For children, data are used to calculate three indices—height-for-age, weight-for-height, and weight-for-age. In presenting the anthropometric results, the height and weight of children in the survey population are compared with the 2006 WHO Child Growth standards[4] that are based on an international sample of ethnically, culturally, and genetically diverse, healthy children living under optimum conditions conducive to achieving a child's full genetic growth potential. The use of the 2006 WHO Child Growth Standards is based on the finding that well-nourished children of all population groups follow very similar growth patterns before puberty.

The height-for-age index provides an indicator of linear growth retardation among children. Children who are less than two standard deviations below the median of the WHO standard reference population in terms of height-for-age may be considered short for their age ("stunted") or chronically malnourished. The weight-for-height index looks at body mass in relation to body length. Children who are less than two standard deviations below the median of the standard reference population in terms of their

3 DHS surveys have also included a number of country-specific biomarkers such as tests for malaria, vitamin A deficiency, iron deficiency, syphilis, herpes, blood pressure, blood glucose, etc.

4 WHO Multicentre Growth Reference Study Group. 2006. *WHO Child Growth Standards: Length/height-for-age, weight-for-age, weight-for-length, weight-for-height and body mass index-for-age: Methods and development.* Geneva. World Health Organization.

weight-for-height may be considered too thin ("wasted"), i.e., acutely malnourished. Wasting represents the failure to receive adequate nutrition in the period immediately before the survey and may be the result of recent illness episodes, especially diarrhea, or of seasonal variations in food supply. Weight-for-age takes into account both chronic and acute malnutrition and is often used to monitor nutritional status on a longitudinal basis. Overweight and obesity are becoming problems for some children in developing countries. The percentage of children more than two standard deviations above the median for weight-for-height indicates the level of this potential problem.

For women (and men), the data on height and weight are used to calculate body mass index (BMI), a way to measure thinness or obesity. BMI is defined as weight in kilograms divided by height squared in meters (kg/m^2). A cutoff point of 18.5 is used to define thinness or acute undernutrition and a BMI of 25.0 or above indicates overweight or obesity.

Anemia testing

Anemia is the condition of low levels of hemoglobin in the blood. This results in a reduced amount of oxygen being transported in the body. Anemia is a serious concern for children because it can impair cognitive development, stunt growth, and increase morbidity from infectious diseases. The main causes of anemia include iron deficiency, malaria, hookworm and other helminthes, other nutritional deficiencies, chronic infections, genetic conditions which vary by region (such as sickle cell and thalassemia), HIV/AIDS, and high fertility.

The DHS standard protocol includes anemia testing for children aged 6-59 months and women age 15-49 (and men, where applicable). Children under six months are not tested because they have higher levels of hemoglobin at birth and just after birth. After obtaining informed consent from the child's parent or guardian (in the case of children) or the respondent (in the case of women), DHS standard procedures are to collect blood samples using a single-use, spring-loaded, sterile lancet to make a finger-prick. The interviewer or health technician then collects blood in a microcuvette from the finger prick. Hemoglobin analysis is carried out on-site using a battery-operated portable HemoCue analyzer which produces a result in less than one minute. Results are given to the child's parent (or guardian) or to the woman/man verbally and in written form in a brochure explaining the causes and prevention of anemia. Those with low hemoglobin levels are urged to seek follow-up care at a health facility and are given a referral letter with the hemoglobin reading to show staff at the health facility. Given that hemoglobin requirements differ substantially at different altitudes, anemia data are adjusted for altitude for presentation in the final report.

HIV testing

In 2001, DHS included anonymous HIV testing in a survey for the first time. Since then, it has been incorporated into the standard DHS questionnaires. Usually, HIV testing is implemented in a sub-sample of households covered in a DHS—very often the same one-third or one-half of households which are selected for the Man's Survey, since both women and men are tested. In most surveys, interviewers are trained to collect the blood samples for HIV testing, while in some surveys, teams include a dedicated health technician for this purpose.

The standard DHS protocol involves asking eligible women and men who were interviewed to voluntarily provide some drops of blood for HIV testing. To obtain informed consent for HIV testing, the interviewer explains the procedures for blood sampling, the confidentiality of the data, and the fact that test results cannot be traced back to or made available to the respondent. He/she also explains that participation in the HIV testing component is entirely voluntary. Respondents who want to know their HIV status are told about nearby facilities that provide testing and counseling services.

If consent is granted, the interviewer uses a single-use, sterile lancet to prick the respondent's finger and collects 3 to 5 drops of blood on a filter paper card. Each filter paper card (there is one card per respondent) is given a barcode label, with a duplicate label attached to the Household Questionnaire. Blood samples collected on the filter papers are dried overnight in a plastic drying box and the next day packed in ziplocked plastic bags with desiccants and a humidity indicator card. The dried blood spots (DBS) are periodically collected in the field and taken to a central laboratory where they are logged in and then frozen until it is time for HIV testing, usually after all the data collection has been completed and the questionnaire data file has been anonymized.

The DBS samples are tested in the laboratory using enzyme-linked immunosorbent assay (ELISA) test kits. All positive samples and 5-10 percent of negative samples are tested with a second ELISA test. Discordant results are tested with a third test as a tiebreaker. Ideally, provisions are also made to re-test a small proportion of samples in an independent laboratory for external quality control.

The standard DHS protocol allows for the linking of the HIV results to the socio-demographic data collected in the individual questionnaires, provided that the information that can potentially identify an individual is destroyed before the linking takes place. This requires that identification codes be deleted from the data file and that the part of the Household Questionnaire containing the cluster identification and names of respondents be destroyed prior to merging the HIV results with the individual data file.

In a few cases, DHS surveys have modified the HIV testing protocol to incorporate home-based rapid testing and counseling and/or more complex testing procedures such as taking venous blood samples for CD4 testing.

C. DHS Fieldwork Manuals

To achieve comparable information across time within the same

country as well as across countries, it is not only important to use similar questionnaires but also similar procedures. Therefore, the DHS program has developed a set of basic documentation to go with the model questionnaires. The basic documentation consists of the following manuals:

- *DHS Supervisor's and Editor's Manual*. This covers the responsibilities of the supervisor (team leader) and the field editor, as well as instructions on how to monitor data collection, observe interviews, and edit completed questionnaires.
- *DHS Interviewer's Manual*. This provides a detailed description of how to locate selected households, how to administer the questionnaire and record responses, and ways to develop good rapport with respondents, as well as a complete review of all questions.
- *Training Field Staff for DHS Surveys*. This manual is designed for survey managers to provide tips on how to organize and conduct training for field staff. It describes techniques of mock interviewing, demonstration interviews in front of the class, and field practice, and contains sample tests for trainees. It also describes how to interpret the field check tables that are produced during the fieldwork. The manual also includes guidance on recruiting and screening field staff and an illustrative training schedule.
- *DHS Biomarker Field Manual*. This manual provides step-by-step instructions for field staff on height and weight measurements, anemia testing and blood spot collection for subsequent HIV testing in a laboratory. Included are lists of equipment and supplies necessary for these tests, with pictures and illustrations.

D. Translating Questionnaires

The main aim of a good survey instrument is to minimize the number of errors that are made when obtaining the desired information. Interviewers can obtain answers that are both valid and reliable only if they are using well-designed questionnaires. Validity is achieved if the question elicits a response that is true and accurate, and measures what is intended to be measured. A good questionnaire should produce valid measures of the indicators intended to be measured, by helping to ensure that the respondent understands what information is being sought. Reliability is achieved if the question elicits a consistent response, no matter who asks the question or where and when it is asked. Using a well-designed questionnaire, each question is asked in the same way by every interviewer and differences between interviewers will be kept to a minimum.

In order to maximize validity and reliability, DHS policy is to use

questionnaires that have been translated into and printed in all the major local languages in which interviews are expected to take place. Studies have shown that when interviewers themselves translate from the language in the printed questionnaire into a different language as they ask the questions, they tend to introduce errors that can often substantially change the meaning of the question. Even small differences of interpretation can destroy the validity and reliability of the final data. As a rough rule, any language group that constitutes 10 percent or more of the sample should have its own translated questionnaire. The need for on-the-spot translation by the interviewer or someone else often cannot be avoided totally, as there may be no adequate language version of a questionnaire for some respondents who fall in the sample. However, the need for on-the-spot translation should be minimized.

Translation is not an easy task and requires both strong linguistic skills as well as an understanding of terms and expressions used in the questionnaires. The recommended approach is that someone who understands both the technical terms as well as both languages translates the questions into the required local language. DHS discourages the use of language institutes or local language radio program hosts to make the translations as this often leads to wording that is too formal or stilted or too imprecise. If there has been an earlier DHS or similar survey that was translated, that translation should be taken into account. The translated questionnaire should be back translated into its original language by an independent translator—preferably someone who is not acquainted with the technical subject matter—without reference to the original questionnaire. The back translation should be compared to the original questions and any discrepancies should be resolved by the two translators in collaboration with survey technical staff.

This process should result in questionnaires that are well understood by respondents who are interviewed in the respective language. It is important to remember that the purpose of the translation is to ensure that every respondent is asked the same question, that they understand the question, and that they feel more comfortable being interviewed in that language. This does not mean that translation should be literal. A good translation will transmit the intended meaning, although it may not be a word-for-word translation.

Survey documentation such as interviewers' and supervisors' manuals should be translated into a language that is understood by all the field staff.

E. Computer-Assisted Interviewing

Traditionally, DHS surveys have utilized paper questionnaires on which interviewers record responses with a pen. More recently, however, DHS has been implementing surveys using **computer-assisted personal interviewing** (CAPI). The CAPI approach initially used personal digital assistants (PDAs), hand-held units that display the questions and in which interviewers record responses. More recently, DHS has switched to using small computer tablets instead of PDAs.

The CAPI approach to interviewing has advantages and disadvantages. CAPI surveys have shown improved levels of data quality in terms of considerably reduced levels of missing data. Data quality is also enhanced by the fact that functions built into the data entry program do not allow inconsistent data to be entered, so the interviewers can probe to avoid inconsistencies during the interview. The data are also available for analysis in an even more timely fashion, because there is no need to wait 3-4 weeks after fieldwork to complete data entry, as is typically the case for paper-based surveys. When CAPI is used, field editors may not be needed or if they are retained, they would have more time to observe interviewers or conduct interviews themselves. The country implementing agency also benefits from the possession of a significant number of computers at the end of the survey, equipment that can either be used for other data collection activities or for other purposes such as education or administrative support.

Potential disadvantages of using CAPI include the cost of the units (one for each interviewer and supervisor), increased level of technical assistance, increased length of field staff training, and logistical difficulties in making revisions to the programming logic once data collection has started and the teams have scattered. Other logistical hurdles are the need to recharge the tablets' batteries, to ensure that data are not lost due to malfunctions and to protect the units from theft.[5]

CAPI surveys require a computer to be purchased for each interviewer and supervisor on the fieldwork team. Additional computers are required for fieldwork coordinators, and some spares need to be purchased to be on hand in case computers in the field are lost, stolen, damaged, or inoperable. In addition to the computers themselves, spare batteries are required (normally at least one extra per fieldworker), plus ancillaries such as computer bags and memory cards for backup of data. Additional items need to be purchased on a per-team basis, such as generators or vehicle power adaptors for use in charging computers when teams do not have access to electricity.

5 MEASURE DHS is developing a guide aimed at survey organizers on using computers as part of data collection.

The prices of both PDAs and tablet computers suitable for use in DHS surveys have decreased in recent years. PDAs are available in the U.S. for around $350-500, and several low-price touch screen tablets are available in the $450-550 price range. The software system used by MEASURE DHS for interviewing is able to run on low-end machines without problems, so these machines are suitable for use in the DHS. Spare batteries are normally priced at around $80-$100, and other accessories such as memory cards and bags are less than $25 each.

The experience in MEASURE DHS CAPI surveys to date is that they require greater levels of technical assistance to implement. The need for technical assistance is in two areas:

- Preparation of the software applications for interviewing and data management
- Training of interviewers and field supervision

The preparation of the interview and data management programs is a relatively complex programming task. This is due to factors such as the size and complexity of the DHS questionnaires, as well as the need to adapt DHS' field data management system to handle functions such as transfers of data and household assignments between supervisors and interviewers using Bluetooth technology. In addition, language text for the survey questions needs to be integrated into the interview programs, which may require considerable additional work if multiple languages are used. As a consequence, the programming time required to implement a CAPI survey is longer than that required for a paper survey.

The second area where technical assistance costs are increased in CAPI surveys is that of training interviewers and supervising fieldwork. Both activities require the participation of data processing specialists with detailed knowledge of the CAPI system and the ability to make necessary changes and corrections to the software system. The length of the main training needs to be extended by several days in order to ensure that all field staff are comfortable using the computer technology. It is also important to arrange for local computer specialists to be available during the data collection phase to visit teams in the field to resolve problems.

In addition to CAPI, the MEASURE DHS project is also experimenting with using computers in the field to increase efficiency and quality control of surveys collecting data on paper questionnaires. With **computer-assisted field editing** (CAFE), each data collection team carries a computer. Data collected on paper questionnaires are entered into the computer every day, allowing the field editor to detect and resolve inconsistencies or other problems immediately. The CAFE approach results in more thorough checking than is possible with the traditional manual review of questionnaires by the field editor. It also accomplishes the first

stage of data entry, resulting in shorter data processing time in the central office.

Finally, the MEASURE DHS project has also developed an **Internet File Streaming System** (IFSS) that allows data to be transferred electronically to headquarters instantaneously. The system requires that team supervisors have tablets or PDAs fitted with cell phone modems. IFSS has the potential to improve the quality of DHS survey results by enabling survey organizations to monitor field team performance on an almost daily basis.

F. PRETEST

A pretest is a critical means of testing survey processes. It is also a mechanism for having the senior survey staff gain experience in training field staff prior to the main training course. The pretest is a way of checking the translations, the skip patterns in the questionnaire, the interviewer's and supervisor's manuals, the application of the biomarkers, and other survey procedures. The pretest usually takes place 2-3 months prior to the main survey.

For the pretest, a small number of field staff is usually trained for about 2-3 weeks. If a number of local language questionnaires are being used, there should be at least 2 female interviewers (and 2 male interviewers if a Man's Questionnaire is being used) per local language questionnaire. DHS recommends training future supervisors as interviewers for the pretest. This ensures that they have extensive training, that their role as supervisors is established before the main training, and that there is sufficient staff available to correct and guide the practice sessions and tests that will be done during the main training.

The pretest data collection typically covers 100-200 households (sometimes more if there are several language versions to test) and takes about 7-10 days to complete. Both urban and rural areas should be included in the pretest. Pretest interviews should be carried out in areas that are not selected for the main survey in order to prevent contamination of the survey results. Some interviews should be conducted in every language that will be used in the main fieldwork, since one of the primary objectives of the pretest is to test the questionnaires in all the languages.

It is important that the pretest fieldwork follows the same procedures that will be followed during the main fieldwork. Thus, a household listing should be prepared in the practice areas beforehand so that teams become acquainted with following the procedures for household and individual respondent selection and using their control forms. The senior survey staff should actively supervise all stages of the pretest so that they become

familiar with problems that are encountered and can recommend solutions. The data from pretest interviews using paper questionnaires do not need to be entered in an electronic file as the data are not analyzed.

The pretest experience is the basis on which the survey questionnaires and manuals will be revised. Key to this activity is that all field staff should make notes of problems experienced during the training, the practice interviews, and the actual interviews. Problems found during the latter can be documented through reports by the survey staff who observe pretest interviews and through a daily debriefing of the pretest interviewers. It is important that all staff involved in the pretest take notes on what they observe. If paper questionnaires are used, it is advisable to have a data processing specialist review the questionnaires before they are finalized to check for structural and skip errors.

G. Recruitment of Field Staff

Highly motivated, well-trained field workers are essential for a successful survey. DHS utilizes a team approach to data collection. Usually, each DHS team is composed of a supervisor, a female field editor, and several female interviewers, since research shows that it is generally advisable to match the gender of interviewers and respondents. When the Man's Questionnaire is also being used, 1-2 male interviewers are added to the team. The selection of the field workers is the first step to obtaining high-quality data. Few implementing organizations have a permanent field force of interviewers and supervisors. Even if they do, the interviewers tend to be predominantly men, while DHS interviewers are predominantly women. Therefore, a DHS generally has to be fielded with staff that is specially recruited for the job. As the data collection will typically last 3-5 months, recruits are usually people who are not currently holding jobs and who are willing and able to spend several months away from home.

Recruitment should take into account the number of staff needed that speak each of the languages in which the survey will be conducted. The number of trainees recruited should be at least 10-15 percent higher than the number needed for fieldwork to allow for attrition and dismissal of candidates who prove to be inadequate. Recruitment should be based on an objective test of the candidates' abilities rather than any other characteristics. Candidates should be presentable, able to walk long distances, and able to establish good rapport with the people they will need to interview. A good team spirit is a further necessary condition. Under no circumstances should recruitment be based on the candidates' relationship to survey staff, favoritism, or other unacceptable recruitment practices.

Team supervisors and field editors should be people who command respect. They also need self-confidence, strong motivation and excellent

team spirit. All these characteristics are desirable in interviewer candidates as well. However, the main characteristics of a good interviewer are the ability to ask questions in a fluent and natural manner and to put the respondent at ease. Interviewers can generally be trained to implement the biomarker component of the survey; however, if the survey includes more complicated biomarkers (e.g., venous blood collection), teams should include health technicians with a health background.

The DHS manual, *Training Field Staff for DHS Surveys* contains useful materials related to recruitment, including information on how to determine the number of field staff required, tips on recruitment, a sample application form, a sample screening test, and interviewing guidelines.

H. Training of Field Staff

As with recruitment of field staff, the quality of survey data is highly dependent on the quality of the training of field workers. DHS procedures for field staff training are covered in depth in *Training Field Staff for DHS Surveys*. This manual includes a discussion of the length of the training course (generally 3-4 weeks), provides a sample agenda for the course, and presents tips on how to train using mock interviews, demonstration interviews, and practice interviews in the field. Candidate interviewers should conduct at least five practice interviews during training. The training course is heavily dependent on the *DHS Interviewer's Manual*.

Final selection of interviewers should be based on their performance on a series of written tests as well as on the observation of their performance during practice interviews in the office and the quality of their field interviews. It is extremely important that the selection criteria are objective. In many places there will be strong pressure on senior survey staff on behalf of particular candidates. However, the only good way to select staff is through a review of candidate qualifications for the job and an objective rating of their performance during training. Indeed, having objective written tests during training can help survey staff document the reasons why certain candidates could not be accepted. A set of sample tests is included in *Training Field Staff for DHS Surveys*.

It is useful to include guest lecturers on particular topics, e.g., family planning methods, background information on HIV/AIDS, and malaria prevention and treatment. Training on anthropometric measurements and/or anemia testing can be conducted by staff from the Ministry of Health or a nutrition organization. It is advisable to brief any outside lecturers ahead of time so that they are aware of the objectives and procedures to be followed in the survey. Otherwise, guest lecturers can contradict survey protocol and confuse field staff.

I. DATA COLLECTION

Prior to the start of the data collection phase of the survey, it is often useful to include some public relations activities to build understanding and support for the survey. Examples of this include advertising the survey to local officials through community meetings or during the household listing operation; printing posters for distribution to the communities selected in the sample; and having radio talk shows and newspaper articles announce the launch of the survey. To the extent that these messages reach the potential respondents, they may encourage participation in the survey and thus increase response rates.

DHS policy calls for a team approach to data collection. The advantages of working in teams are many, but the main one is the ability to achieve a higher level of supervision of the work. An additional reason is the need for special means of transportation for most interviewers. In many countries, safeguarding the wellbeing of the field staff is another important reason for working in teams.

As mentioned above, teams generally consist of one supervisor (team leader), one female field editor, 3-4 female interviewers, and 1-2 male interviewers, if a survey of men is included. Depending on the type and complexity of the biomarkers included in the survey, the team may also include one or more health technicians. In most countries, each team has its own vehicle and is usually accompanied by a driver. The size of the team is often limited by the carrying capacity of the vehicles that will be used. The field vehicles must be large enough to carry all of the team members, their gear, and all supplies and equipment (including questionnaires, field forms, manuals, biomarker supplies, GPS units, samples of ORS packets, vitamin A pills, etc., and a first aid kit).

The supervisor is in overall charge of the team and the daily organization and supervision of the team's work. He/she assigns work to the other team members, is responsible for the vehicle and driver, and may also be responsible for locating accommodation for the team. The field editor is mainly in charge of checking the quality of the interviews, both by reviewing all questionnaires and by observing interviews. In actual practice, the supervisor and the field editor will need to share each other's responsibilities in order to build and maintain a good interviewing team. Their roles are discussed in more detail in the *DHS Supervisor's and Editor's Manual*.

The number of teams to be used depends on a number of criteria, including the sample size, the desired duration of data collection, the number of capable interviewers and supervisors that can be recruited, the number of languages spoken in the country, and even the number of

vehicles available. A related consideration is the amount of funding available for the survey.

Calculating the duration of data collection involves making assumptions about the number of completed interviews that an interviewer can do in a day, the total number of interviewers that will be used and the time that is needed for travel between clusters. Data collection preferably takes 3-5 months. Longer durations can lead to interviewer fatigue and attrition, while shorter durations are inefficient since considerable time and expense is invested in the training. The quality of the field staff should be as high and uniform as possible. Ideally, no more than 12-15 teams with 60-90 interviewers should be used, though larger surveys will require more field staff.

If possible, all teams should start fieldwork in the same location, in order to make supervision of all teams by senior survey staff possible during the time that supervision is most needed. If teams scatter all across the country from the beginning it is more difficult to visit all teams immediately.

Survey teams should be assigned sample areas taking into account languages spoken and other requirements and to ensure that the travel times per team are minimized as much as possible. Generally, teams work 6 days per week and work away from home for several weeks or months at a time. Some countries schedule data collection in phases such that teams work every day for about three weeks and then get 4-5 days off to visit their families. Although this approach has advantages for field staff morale, it can also be more expensive and can sometimes result in delays in getting each subsequent phase launched.

If an interview is not completed on the first visit, the sampled household or respondent should be contacted at least three times, over at least two different days, before an interview is classified as a nonresponse. When most of the team has finished work but one or two callbacks are remaining for another day, it is not uncommon for the team to move to a new cluster and to leave one interviewer behind to complete the callbacks. This is possible when the new cluster is not too far away and the team vehicle can pick up the interviewer left in the old cluster. In other circumstances, the whole team needs to stay until all work in the cluster is completed.

Teams need to have a sufficient supply of questionnaires and materials with them to ensure that work can continue full speed at all times. When paper questionnaires are used, the completed ones need to be packed, protected from the elements and safeguarded until they can be transmitted to the home office, usually via the roving fieldwork coordinators and senior staff who periodically visit each team.

J. Data Quality Control

Heavy emphasis on data quality is a hallmark of a DHS survey. The most important way to ensure high quality data is to adequately supervise the data collection. DHS surveys generally employ several levels of supervision.

The first level of supervision is provided by the team supervisors and field editors. The supervisors are responsible for closely monitoring the work of the teams to ensure that all sampled households are visited and all eligible respondents are contacted. An important element in this is for the supervisors to periodically return to a few households that were recently interviewed to do a short reinterview, listing the household members and comparing the list with what was reported by the original interviewer. The main purpose of such reinterviews is to uncover any deliberate distortion of age or omission of household members by interviewers so as to reduce their workload.

Field editors are responsible for observing interviewers to ensure that they are conducting the interviews accurately and respectfully. They also should observe the biomarker data collection to ensure that all procedures are accurately implemented. Ideally, they should observe at least one interviewer a day and rotate among all the interviewers, especially in the early weeks of fieldwork. Finally, they are also responsible for reviewing all paper questionnaires in the field for accuracy and completeness and for packing them appropriately for transfer to the central office. All field editing should be completed before the team leaves the cluster so that if major problems are found, interviewers can return to the interviewed person to obtain the correct information.

A second level of supervision consists of central office staff visits to the field. It is expected that the survey director, field coordinators, trainers, MEASURE DHS staff and possibly other qualified survey staff will visit teams on a regular basis to check on their work. During this check, at least one or two questionnaires of each interviewer should be checked after the editor has reviewed them. This way, both interviewer and field editor mistakes can be caught at the same time. This check can either be done by hand or by entering key sections of the questionnaire into a PDA or a laptop computer. Problems and/or errors should be discussed in review sessions with the teams.

In addition to the regular interviewing teams, many countries employ one or two quality control teams consisting of 2-3 good interviewers who make spot checks on teams in the field. As part of their checking, they not only review some of the completed questionnaires and observe interviews, but they also visit a sub-sample of the households selected to fill selected

portions of the Household Questionnaire which they will subsequently compare with the data from the original questionnaires. The quality control team will also observe biomarker data collection and handling.

Finally, a set of field control tables are produced periodically during fieldwork to check the data that are entered. These tables look at issues such as response rates, the age distribution of household members, and the level of missing values for key questions. The tables are produced by team, and are reviewed by senior survey staff. Any problems that appear from review of these tables are discussed with the appropriate teams and attempts made to ensure that they do not persist. (For a complete description of the field check tables, see *Training Field Staff for DHS Surveys*).

In addition to these levels of supervision and checking completed work, it is important to remember that data quality depends on the motivation and morale of the data collection team. Some inexpensive ways to motivate teams include providing them with T-shirts or bags that have the survey name on them, issuing identity cards, and holding a ceremony at the end of the training course to give out certificates of completion. Survey organizers may want to consider a competition between teams to identify the Team of the Month as being the one that produced the most completed interviews with a high level of quality. Another way to motivate teams is to have a system of bonuses paid at the end of the data collection to the teams that did the best work in terms of efficiency and quality, though this needs to be carefully thought out so as not to create an environment of rushing through work.

K. Data Processing

In DHS surveys that utilize paper questionnaires, data processing generally starts 1-2 weeks after the start of fieldwork and is usually completed within a month after fieldwork has been completed. The DHS approach includes tight control over questionnaires, coding of open-ended questions, interactive data entry, complete (100%) verification of data entry, office editing of inconsistent data, imputation of missing dates of vital events, and creation of a standardized, recoded dataset. Data entry should take place in a separate room, where the staff is not disturbed and where the questionnaires are secure. This room should be close to the space where completed questionnaires are stored. All questionnaires will be handled several times during data entry and editing and proximity between the storage and data entry facilities can save a considerable amount of work and aggravation. Data entry staff should probably not work more than 6-7 hours per day, due to the relatively mechanical nature of the operation. Depending on the number of computers available for the data entry operation, more than one shift of data entry staff may be necessary in order

to finish data entry and editing shortly after the end of fieldwork. Care should be taken when using double shifts to ensure that staff are trained uniformly so as to avoid inconsistencies from having multiple supervisors and office editors.

DHS policy is to enter the data from all questionnaires twice ("double entry"), compare the results, and resolve any discrepancies. Such 100 percent verification greatly reduces the amount of secondary editing of inconsistencies and results in a "cleaner", more consistent dataset.

In DHS surveys that utilize the CAPI approach, data entry is accomplished at the same time as interviewing. Many of the checks for inconsistent and missing values are built into the system. Teams are instructed on how to back up the files of completed interviews at the end of each day. Data are also periodically relayed to the central office both for safekeeping and for checking.

As mentioned above, the data processing supervisor periodically produces a selected set of field check tables, with a view to checking for problems that cannot easily be identified during field supervision. These tables are reviewed by senior survey staff who communicate any problems to the appropriate teams.

Once the final dataset is complete and sample weighting factors have been added, a set of tables for the preliminary report is produced, followed by tables for the final report (see *Guidelines for the MEASURE DHS Phase III Main Survey Report*, also known as the Tabulation Plan). Tabulations of data from country-specific questions need to be designed in collaboration with the persons or institutions that requested these extra questions. This work needs to be done well before data collection is completed in order to ensure that the tabulation process is smooth. All tabulations should be checked thoroughly for accuracy. Estimates based on a small number of cases (25-49) are shown in parentheses, while those based on a very small number of cases (typically fewer than 25 respondents) are suppressed in reports (shown by an asterisk).

L. Analysis and Report Writing

Three reports of survey findings are generally produced for a DHS survey. The first is a brief preliminary report that is usually produced within three months after the end of data collection. It consists of 15-20 tables on key indicators, with accompanying text and graphs. This report is usually prepared jointly by the implementing organization and MEASURE DHS staff. The preliminary report usually has limited distribution.

As mentioned above, the basis for the more detailed final report is the set of DHS model tabulations (*Guidelines for the MEASURE DHS Phase III Main Survey Report*) modified by the MEASURE DHS country manager and host country staff to fit the questionnaires used and supplemented by country-specific tables. Individual chapters of the final report are generally written by local survey staff and collaborators, with review and editing by MEASURE DHS staff. Frequently, MEASURE DHS staff assist in-country staff to organize a one- to two-week report-writing workshop with authors of the various chapters. These workshops serve not only as a catalyst to getting the chapters drafted, but also as a capacity-building exercise to acquaint authors with technical aspects of the survey implementation,

interpretation of tables, and tips on technical writing. MEASURE DHS report production staff usually format the report and send the files to the country for printing. A first draft of the main survey report is usually produced within 8-9 months of the end of fieldwork, while the printed version is usually available within 12 months after the end of fieldwork.

For most surveys, a shorter Key Findings Report that focuses on the most important findings of the survey is also produced, with a view to achieve the widest possible dissemination of the data in an easily accessible format. The report on key findings is produced concurrent with the main survey report and is available at the time of the national seminar. The Key Findings report is generally drafted by MEASURE DHS staff and reviewed by staff in the implementing country.

In addition to these survey reports, MEASURE DHS often assists countries with conducting more in-depth "further analysis" of the survey data. These analyses typically result in a research paper of 30-60 pages and address topics of special interest, but can also consist of a published journal article, a paper or poster for presentation at a professional meeting, a working paper, or short analytic statements that permit a country to respond to policy relevant and/or other issues.

M. Data Dissemination

Dissemination of the survey results to all the relevant audiences is a key objective of the DHS survey program. Not only does this ensure that survey results are used to enhance policies and programs, but it also encourages demand for future surveys. DHS survey reports are distributed widely at the local level and also are made available to cooperating agencies and other institutions that work in the respective countries. Survey reports are also available for viewing and downloading on the DHS website (www.measuredhs.com).

The culmination of the DHS survey process usually consists of a one-day national seminar to present the main survey findings to policy makers, program managers, researchers, non-governmental organizations, and representatives of donor organizations. The seminar is generally covered in the mass media, thus helping to generate utilization of the data for policy and program purposes. Press releases, Powerpoint slides, wallcharts, factsheets, chartbooks, policy briefs, posters, CDs, atlases, videos, and many other materials are often developed in conjunction with the national seminar to achieve wider dissemination of the survey results (for examples of these documents, see the Data Dissemination section of the DHS Toolkit). Many countries organize regional seminars to ensure that the results are known and utilized beyond the national policy and program level.

Examples of other in-country data dissemination activities include specialized reports (e.g., a booklet on youth or a report on gender-related findings), workshops with journalists, special meetings with parliamentary committees or professional organizations, and mini-seminars with small groups such as units in the Ministry of Health. DHS also organizes data users' workshops with researchers to provide guidance on how to manipulate the often complex datasets to enable them to conduct their own research. Workshops on using the geographic information system (GIS) data have also been widely implemented. Finally, DHS has participated in the development of a 5-day curriculum to train university students and public health program staff on the nature and use of DHS data: *Understanding and Using the Demographic and Health Surveys–DHS Curriculum Facilitator's Guide*.

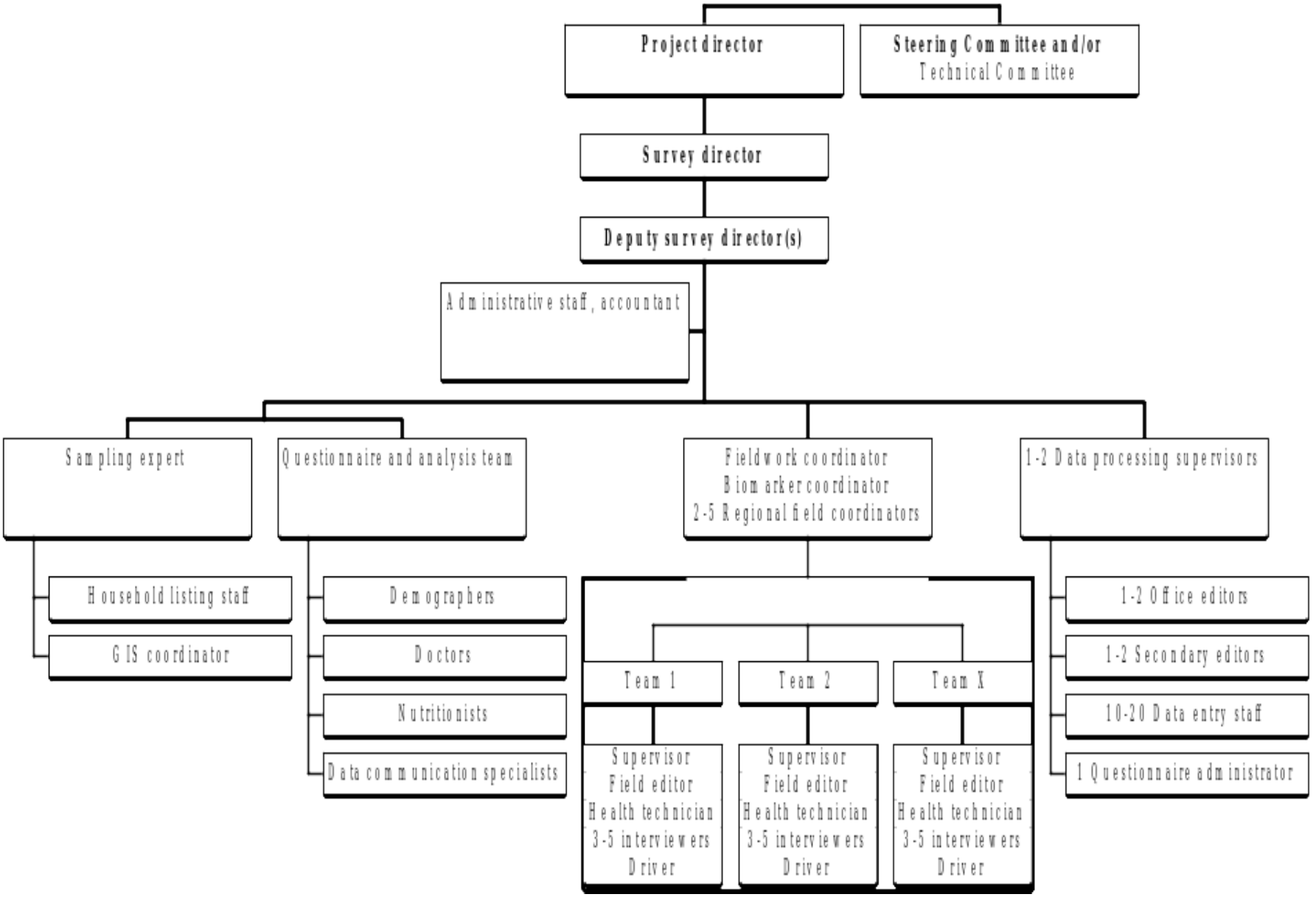
After release of the final survey report, the survey data are entered into the DHS data archive. Countries that participate in the DHS program authorize the use of their data by responsible researchers worldwide. The data archive team at DHS tracks data requests and provides data and documentation to those who are authorized to use them. The DHS website (www.measuredhs.com) provides access to DHS final reports and other survey reports, survey datasets, other publications, and information on survey methods. Use of DHS data is facilitated by the reformatting of each dataset into a standard recode file. This file standardizes the variable names, location, and value categories across countries and constructs many of the commonly used variables such as age in five-year groups. Because DHS surveys collect an enormous amount of information on different subjects for the household, women age 15-49, children under age five, and often men age 15-59, these standard recode files are a particular advantage for cross-country analysis. In addition, the website has several tools to increase access to and use of DHS data:

- ***STATcompiler:*** The DHS STATcompiler (www.statcompiler.com) is an online database tool that allows users to create customized tables with data from about 90 countries and over 200 indicators. STATcompiler produces uniform estimates from a single computer program for all DHS datasets with just a click of a mouse. STATcompiler also allows users to visualize and explore data in column charts, line graphs, maps, and scatterplots.
- The ***HIV/AIDS Survey Indicators Database*** is similar to the STATcompiler but includes only indicators related to HIV. The HIV/AIDS indicators collected in DHS and AIS surveys will soon be merged into the STATcompiler web utility.

Further dissemination of survey data is also achieved through the publication of additional reports. Of particular relevance for program and

policy purposes is the DHS Comparative Report series. These reports provide information across survey countries and can contribute greatly to the policy debate through the exhaustive view they provide on a particular situation in a large number of countries. Analytical Reports are also published and provide rigorous analysis of survey data.

Appendix A. Prototype Survey Staffing Pattern



Appendix B. Budget Template

day/month/year

BUDGET FOR [COUNTRY] DEMOGRAPHIC AND HEALTH SURVEY

(template only--cost per unit of all items set to 1)

	Item	No of items	No of units	Unit m=month d=day	Cost per unit	Total Local currency	Total US $
I	**ADMINISTRATION**						
	1 Salaries*						
	Survey director	1	12	months	1	12	12
	Deputy survey director	1	12	months	1	12	12
	Fieldwork coordinator	1	6	months	1	6	6
	Field biomarker coordinator	1	6	months	1	6	6
	Geographic information system coordinator	1	3	months	1	3	3
	Project accountant (half time)	1	12	months	1	12	12
	Secretary	1	12	months	1	12	12
	Subtotal salaries					**63**	**63**
	2 Supplies/other						
	Tea/snacks for Steering Committee	**3**	3	times	1	9	9
	Fee to ethics board to review protocol		1	time	1	1	1
	Photocopying		5,000	pages	1	5,000	5,000
	Office supplies (paper, toner, pens, etc)		12	months	1	12	12
	Subtotal supplies					**5,022**	**5,022**
	SUBTOTAL ADMINISTRATION					***5,085***	***5,085***
II	**HOUSEHOLD LISTING**						
	1 Salaries						
	Supervisors/mappers	10	1.5	months	1	15	15
	Listers	10	1.5	months	1	15	15
	Drivers	10	1.5	months	1	15	15
	Subtotal salaries					**45**	45
	2 Per diems during listing						
	Trainers/central office staff	2	10	days	1	20	20
	Supervisors/mappers	10	45	days	1	450	450
	Listers	10	45	days	1	450	450
	Drivers	10	45	days	1	450	450
	Drivers for trainers/office supervisors	2	10	days	1	20	20
	Guides, local officials	1	300	clusters	1	300	300
	Subtotal allowances					**1,690**	**1,690**
	3 Transport						
	Transport for trainees to get to training	20	2	ways	1	40	40
	Vehicle maintenance (central office staff)	2	10	days	1	20	20
	Vehicle rental (listing teams)	10	45	days	1	450	450
	Fuel for supervision	2	1,500	km	1	3,000	3,000
	Fuel for teams (100 kms/day x 45 days)	10	4,500	km	1	45,000	45,000
	Subtotal transport					**48,510**	**48,510**
	4 Printing, supplies, other						
	Training venue	1	2	days	1	2	2
	Lunch, tea, snacks (inc. trainers)	25	2	days	1	50	50
	Listing manuals	35	10	pages	1	350	350

Appendix B. Budget Template

	Listing forms	320	17	pages	1	5,440	5,440
	Maps	300	1	copies	1	300	300
	Supplies					1,000	1,000
	Subtotal supplies					**7,142**	**7,142**
	SUBTOTAL LISTING					**57,387**	***57,387***

day/month/year

BUDGET FOR [COUNTRY] DEMOGRAPHIC AND HEALTH SURVEY

(template only--cost per unit of all items set to 1)

Item		No of items	No of units	Unit m=month d=day	Cost per unit	Total Local currency	Total US $
III PRETEST							
	1 Salaries						
	Field editors—females	3	1	month	1	3	3
	Interviewers—females	12	1	month	1	12	12
	Interviewers—males	3	1	month	1	3	3
	Drivers	3	1	month	1	3	3
	Subtotal salaries					**21**	**21**
	2 Per diem during fieldwork						
	Trainers/central office staff	6	10	days	1	60	60
	Field editors—females	3	10	days	1	30	30
	Interviewers—females	12	10	days	1	120	120
	Interviewers--males	3	10	days	1	30	30
	Team drivers	3	10	days	1	30	30
	Guides, local officials	1	300	cluster s	1	300	300
	Subtotal per diems-fieldwork					**570**	**570**
	3 Transport						
	Transport for trainees to get to training	15	2	ways	1	30	30
	Bus (coaster) for field practice	1	2	days	1	2	2
	Fuel for field practice	1	150	kms	1	150	150
	Vehicle maintenance	3	10	days	1	30	30
	Fuel for teams (120 kms/day)	3	1,200	km	1	3,600	3,600
	Subtotal transport					**3,812**	**3,812**
	4 Other						
	Training venue	1	2	days	1	2	2
	Lunch, tea, snacks (inc. trainers)	25	2	days	1	50	50
	Translations**	1	3	langs	1	3	3
	Back translations	1	3	langs	1	3	3
	Photocopy household questionnaires	300	24	pages	0.1	720	720
	Photocopy women's questionnaires	300	58	pages	0.1	1,740	1,740
	Photocopy men's questionnaires	200	25	pages	0.1	500	500
	Photocopying interviewers' manuals	25	126	pages	0.1	315	315
	Photocopying supervisors' manuals	10	37	pages	0.1	37	37
	Photocopying biomarker manuals	25	66	pages	0.1	165	165
	Airtime	3	10	days	1	30	30
	Subtotal other					**3,565**	**3,565**
SUBTOTAL PRETEST						***7,968***	***7,968***

IV	**MAIN TRAINING**						
	1	***Salaries***					
		Regional field coordinators	3	1	month	1	3	3
		Supervisors (team leaders)	15	1	month	1	15	15
		Field editors--females	15	1	month	1	15	15
		Interviewers--females (plus extras)	70	1	month	1	70	70
		Interviewers--males (plus extras)	20	1	month	1	20	20
		Subtotal salaries					**123**	**123**
	2	***Transport***						
		Transport for trainees to get to training	120	2	ways	1	240	240
		Bus (coaster) for field practice	3	2	days	1	6	6
		Fuel for field practice	3	150	kms	0.1	45	45
		Subtotal transport					**291**	**291**

day/month/year

BUDGET FOR [COUNTRY] DEMOGRAPHIC AND HEALTH SURVEY

(template only--cost per unit of all items set to 1)

Item			No of items	No of units	Unit m=month d=day	Cost per unit	Total Local currency	Total US $
	3	***Printing***						
		Household questionnaires (24 pp)	1	11,000	copies	1	11,000	11,000
		Woman's questionnaires (58 pp)	1	11,000	copies	1	11,000	11,000
		Man's questionnaires (25 pp)	1	4,000	copies	1	4,000	4,000
		Interviewers' manual (126 pp)	1	150	copies	1	150	150
		Supervisors' manual (37 pp)	1	30	copies	1	30	30
		Biomarker manual (66 pp)	1	30	copies	1	30	30
		Field control forms	350	10	pages	0.1	350	350
		Subtotal printing					**26,560**	26,560
	4	***Other***						
		Training venue (non-residential)	1	21	days	1	21	21
		Lunch, tea, snacks (inc. trainers)	130	21	days	1	2,730	2,730
		Pens, pencils, flipcharts, envelopes					100	100
		Subtotal other					**2,851**	**2,851**
	SUBTOTAL MAIN TRAINING						***29,825***	***29,825***
V	**SURVEY FIELD WORK**							
	1	***Salaries***						
		Regional coordinators	3	4	months	1	12	12
		Supervisors (team leaders)	15	4	months	1	60	60
		Field editors—female	15	4	months	1	60	60
		Interviewer-female	60	4	months	1	240	240
		Interviewer-male	15	4	months	1	60	60
		Drivers for teams	15	4	months	1	60	60
		Subtotal salaries					**492**	**492**
	2	***Per diems***						
		Trainers/central office staff	6	20	days	1	120	120
		Regional field coordinators	3	60	days	1	180	180
		Supervisors (team leaders)	15	120	days	1	1,800	1,800
		Field editors—females	15	120	days	1	1,800	1,800
		Interviewers—females	60	120	days	1	7,200	7,200
		Interviewers—males	15	120	days	1	1,800	1,800
		Drivers—teams	15	120	days	1	1,800	1,800
		Drivers—reg. field coords, central office staff	3	40	days	1	120	120

	Guides, local officials	1	300	cluster s	1	300	300
	Subtotal per diems					**15,120**	**15,120**
3	***Transport expenses***						
	Vehicle maintenance	18	4	months	1	72	72
	Fuel — teams (100 kms./day x 120 days)	15	12,000	kms.	0.1	18,000	18,000
	Fuel—reg. field coords (200 kms./day x 40 days)	3	8,000	kms.	0.1	2,400	2,400
	Subtotal transport					**20,472**	**20,472**

day/month/year

BUDGET FOR [COUNTRY] DEMOGRAPHIC AND HEALTH SURVEY

(template only--cost per unit of all items set to 1)

	Item	No of items	No of units	Unit m=month d=day	Cost per unit	Total Local currency	Total US $
	4 Other						
	Biomarker supplies***				1	1	1
	Pens, stationery, envelopes, string, staplers				1	1	1
	Identity cards	125	1	each	1	125	125
	Clip board	150	1	each	1	150	150
	Back-packs/ bags	125	1	each	1	125	125
	Umbrellas	125	1	each	1	125	125
	Medical insurance	125	1	each	1	125	125
	Torches	125	1	each	1	125	125
	Airtime for field staff	110	4	months	1	440	440
	Airtime for team supervisors, reg. field coords.	18	4	months	1	72	72
	Subtotal other					**1,289**	**1,289**
	SUBTOTAL FIELD WORK					***37,373***	***37,373***
VI	**DATA PROCESSING (PDAs)**						
	Data processing supervisor	1	6	months	1	6	6
	Office editor (statistician)	1	5	months	1	5	5
	Data entry operator	15	5	months	1	75	75
	Office stationery				1	1	1
	Computers, printers, cables, UPS				1	1	1
	SUBTOTAL DATA PROCESSING					***88***	**88**
VII	**LABORATORY COSTS FOR HIV**						
	Lab supervisor	1	60	days	1	60	60
	Attendees--transport allowances	4	60	days	1	240	240
	Expendable supplies				1	1	1
	Electricity, water, use of freezers, fridges, etc.				1	1	1
	Test kits, ELISA and other lab supplies				1	1	1
	External quality control at another lab				1	1	1
	SUBTOTAL LABORATORY					***304***	***304***
VIII	**NATIONAL SEMINAR**						
	Banner, press release, notebooks, etc.				1	1	1
	Venue rental	1	1	day	1	1	1
	Lunch, tea	1	300	guests	1	300	300
	SUBTOTAL SEMINAR					***302***	***302***
	TOTAL LOCAL COSTS					**138,332**	**138,332**

Notes:

Exchange rate:U.S. $1 = [Local currency] 1

* If survey is implemented by a government organization, staff salaries are usually an in-kind government contribution.

** Translations into: [Language #1, Language #2]

**

* Hemocue machines, gloves, alcohol, filter papers, height boards, scales, barcode labels, etc.

Assumptions:

- Assumes that trainers/senior office staff act as team supervisors for the pretest

- Assumes a sample of 9,000 households in 300 sample points.
- Assumes 15 teams with 1 supervisor, 1 field editor, 4 female interviewers, 1 male interviewer, and 1 driver.
- Assumes each team can complete 1.2 sample points per week.
- Assumes use of vehicles from implementing organization for data collection; rental of vehicles for household listing.
- Assumes 4-wheel drive vehicles that average 10 km/litre. Fuel costs= [x] per litre.
- Regional field coordinators and biomarker coordinators will travel together or with senior staff supervisors.